

Thysanoptera of the Hawaiian Islands

BY DUDLEY MOULTON

San Francisco, California.

(Presented by O. H. Swezey at the meeting of June 2, 1927.)*

Our knowledge of the Thysanoptera from the Hawaiian Islands has been largely based on Mr. R. S. Bagnall's excellent paper published in 1910 (Fauna Hawaiiensis, Vol. III, Part VI) and with some additions made by Mr. Kirkaldy (Kirkaldy, 1907, Proc. Haw. Ent. Soc., 1, p. 102) and Mr. A. C. Morgan (Proc. Nat. Mus. Vol. 46, No. 2008, p. 3). Many years ago Mr. D. T. Fullaway sent me a number of specimens which have never been reported on and Messrs. O. H. Swezey, F. X. Williams and W. M. Giffard have recently added many new collections. I am presenting in this paper a report of the specimens now before me, with listings of species recorded by other writers, making this a complete record of all known species from the Hawaiian Islands. Several of Bagnall's species listed under *Dolerothrips* will probably later be referred to the genus *Hoplothrips* but I am here listing them under the original genus as I do not have specimens for study. I wish here to express my deep appreciation to Messrs. Fullaway, Swezey, Williams and Giffard for their cooperation in making collections of thrips for me to study.

TEREBRANTIA

Family AEOLOTHRIPIDAE

Aeolothrips fasciatus (Linn.) 1761

A single ♀ specimen collected by Mr. O. H. Swezey on *Cyathodes Tameiameiae* at Haleakala, Maui, at an elevation of 6000 feet, on June 15, 1927. This is the first record of the genus *Aeolothrips* being found in the Hawaiian Islands. (Moulton No. 2543.)

* Substantial additions were made to this paper subsequently from material received at later dates. [EDITOR.]

Family THRIPIDAE Subfamily HELIOTHRIPINAE Karny

Heliothrips haemorrhoidalis Bouche 1833

Five ♀ specimens, two dark colored and three with abdomen light yellowish color. Collected from *Croton* leaves at Honolulu, *Fuschia*, *Metrosideros polymorpha* and other plants in the region of Kilauea volcano, Hawaii, at an elevation of 3000-4000 feet in February, March and September, 1927, by Messrs. O. H. Swezey and W. M. Giffard. (Moulton Nos. 1819, 1855.)

Subfamily CHIOTHRIPINAE Karny

Limothrips cerealium Halid. 1836

(Previously recorded by Mr. R. S. Bagnall in Fauna Hawaiiensis, III, pt. VI, p. 701, 1910.)

Chirothrips mexicanus Crawford. 1909

Nineteen ♀ and three ♂ specimens collected on *Chloris paraguayensis* February 22, 1927, at Koko Head, Oahu; on *Eragrostis variabilis* March 13, 1927, at Waimanalo, Oahu and on *Eragrostis* (heads) April 10, 1927, at Kolekole Pass, Oahu. All collections made by Mr. O. H. Swezey.

The female of this species was originally collected in Mexico and described by Mr. D. L. Crawford, and later it was found in the West Indies. This record now extends its distribution to the Hawaiian Islands.

The male is described as follows:

Color: Head and thorax light brownish yellow with head shaded a little deeper brown; abdomen brown, first segments lighter, terminal segments darker. Antennal segments one, two and three light brownish yellow with one and three slightly darker, four brown, five to eight dark brown. Fore legs yellow except blackish brown spot at end of tarsi, middle and hind femora and tibiae dark brown, femora shading lighter at base, and tibiae lighter at tip, tarsi yellow.

Total body length .8 mm.; head length, .09 mm., width .093 mm.; prothorax length .170 mm., width .201 mm.; pterothorax width .22 mm. Segments of antennae: length (width) I, 24 (39); II, 21 (30); III, 21 (24); IV, 24 (27); V, 18 (20); VI, 24 (15); VII, 11; VIII 9; total length 150 microns. Longest spines on posterior angles of prothorax 21 m., other spines on head and thorax vestigial.

Head, antennae, prothorax and fore legs shaped as in the female. Ocelli absent. Mouth cone short, reaching to near middle of prosternum. Wings absent. Abdominal sternites without evidence of ventral depressions.

Described from three ♂ specimens. Allotype in author's collection, one paratype deposited in the collection of the Hawaiian Entomological Society, Honolulu. (Moulton Nos. 1813, 1816 and 1822.)

Subfamily SERICOTHRIPINAE Karny
Tribe ANAPHOTHRIPINI Pr.

Anaphothrips (Chaetanaphothrips Pr.) orchidii (Moulton), 1907

A single ♀ specimen of this thrips was collected by Mr. F. X. Williams on *Commelina nudiflora*, Mt. Tantalus, Oahu, December 12, 1926. (Moulton No. 1443.)

Anaphothrips (Anaphothrips) swezeyi n. sp.

Female holotype: Color: body and legs uniformly light yellow to brownish yellow; antennal segments one, two, three and basal half of four yellowish, three shaded gray brown in outer third and four darker gray brown in outer half, five grayish yellow in basal third, dark brown in distal two-thirds, six to eight dark brown, six sometimes light at extreme base. Ocelli with deep orange-red crescents. Tip of mouth cone dark brown. Fore wings with scale light brown, a distinct though not clearly defined light brown cloud along anterior vein which is broader near base, gradually becoming narrower until it fades completely just past middle of wing; a dark cloud along posterior vein beginning near basal quarter of wing and fading completely near distal quarter, tip of wing clear.

Total body length 1.00 mm.; head length .10 mm., width .12 mm.; prothorax length .10 mm., width .13 mm.; mesothorax width .18 mm. Segments of antenna: length (width) I, 15 (24); II, 30 (24); III, 36 (18); IV, 33 (18); V, 36 (15); VI, 45 (15); VII, 9; VIII, 9; total length 225 microns.

This species is closely related to *A. obscurus* Muller, so a detailed description would hardly be necessary here. It may be separated from *obscurus* by its smaller and more slender body, and also by the coloring of the antennae and wings. There are no prominent spines on head or prothorax, while the wing spines are similar in number and arrangement to *obscurus*. The mouth cone reaches to near posterior margin of prothorax. Wings extend to eighth abdominal segment, and veins of the fore wings are indistinct, while in *obscurus* they are prominent and darker colored. Comb along posterior margin of segment eight well-developed.

Described from fifty-nine ♀ specimens taken on *Chaetochloa verticillata* and on *Panicum torridum* by Messrs. O. H. Swezey and F. X. Williams at Honolulu, T. H. Holotype in author's collection, paratype deposited in the collection of the Hawaiian Entomological Society, Honolulu. (Moulton Nos. 1448, 1818 and 2554). I take pleasure in naming this species after one of the collectors, Mr. Swezey.

Subfamily THRIPINAE

Scolothrips sexmaculatus (Pergande), 1894

(Previously recorded by Mr. R. S. Bagnall in Fauna Hawiienis, III, pt. VI, p. 700, 1910).

Frankliniella flavens n. sp.

Female holotype: Color: body and legs clear light lemon yellow with pterothorax a little darker. Antennal segment one whitish, two to five light yellow with a slight tinge of brown in the outer portions, six brownish yellow in basal third, abruptly dark brown in distal two-thirds, seven and eight dark brown. Crescents of ocelli deep orange red. Mouth cone tipped with black.

Total body length 1.06 mm.; head length .105 mm., width .150 mm.; prothorax length .135 mm., width .174 mm.; pterothorax width .224 mm. Segments of antenna: length (width) I, 21 (30); II, 33 (24); III, 51 (18); IV, 45 (18); V, 42 (18); VI, 54 (18); VII, 12; VIII, 15; total length 285 microns. Length of spines, interocellars 36 m., postoculars 30 m., on anterior margin of prothorax 30 m., on anterior angles 45-54, on posterior angles subequal 75, on ninth and tenth abdominal segments subequal 120 microns.

Head clearly transverse, almost one-third wider than long, apex rounded; cheeks almost straight and parallel. Interocellar spines rather long, placed in front of and inward from each posterior ocellus, postoculars shorter. Eyes and ocelli normal, eyes occupying about two-fifths the sides of the head. Mouth cone long and pointed, reaching beyond the posterior margin of prosternum. Antennae slender approximately two and one-half times as long as head; sense cones normal, pedicel of third antennal segment without abrupt sub-basal thickening, (*intonsa* group).

Prothorax clearly transverse and .25 wider than long, slightly wider than head, spines well developed. A series of five spines along posterior margin uniformly small and inconspicuous except only the fourth which is strong and fully two and one-half times longer than the others. Pterothorax normal. Legs normal. Wings fully developed, reaching to near tip of abdomen, fore wings with spines as follows: costa 21-24, fore vein 21-22, hind vein 15-17, scale with five spines along outer margin and a sixth one near base on inner margin. Abdomen normal, comb along posterior margin of segment eight fully developed but sparse, tenth segment with dorsal suture.

Male allotype: Color uniformly clear light lemon yellow excepting only distal two-thirds of sixth antennal segment and seventh and eighth which are abruptly dark brown. Ocelli deep orange red.

Total body length .86 mm.; head length .096 mm., width .13 mm.; prothorax length .11 mm., width .14 mm.; pterothorax width .174 mm. Segments of antenna: length (width) I, 18 (24); II, 33 (21); III, 45 (18); IV, 42 (15); V, 36 (15); VI, 45 (15); VII, 9; VIII, 12; total length 234 microns. Length of spines, interocellars 45 m., postoculars 27 m., on anterior margin and angles of prothorax 48, on posterior angles, outer 60, inner 48, fourth from the outside along the posterior margin 30, on ninth abdominal segment 81, short spur-like spines 15, on tenth 81 microns.

Head wider than long, but not so conspicuously transverse as in the female; cheeks almost straight and parallel. Interocellar spines longer than postoculars. Eyes and ocelli normally developed. Antennae slender, two and one-half times as long as head, pedicel of third segment without pronounced sub-basal thickening.

Prothorax only slightly wider than head, all normal spines present, those along posterior margin uniformly small except only the fourth as in the female. Wings fully developed with spines as follows: costa 19-22, fore vein 19-20, hind vein 15-16. Abdomen slender.

Described from one ♂ and ten ♀ specimens taken at Honolulu on March 19, 1927, by Mr. O. H. Swezey on young corn plants. Holotype and allotype in author's collection, paratypes deposited in the collection of the Hawaiian Entomological Society, Honolulu. (Moulton No. 1817).

This species may be compared with *pallida* Uzel (Europe), *dampfi* Priesner (Egypt), *ameliae* Hood (Panama) and *sulphurea* Schmutz (India). *Pallida* is darker in color and stouter. Prominent spines on prothorax almost twice as long and the longest spines on the ninth abdominal segment approximately 140-150 m. in *pallida* as compared with 120 in this species, and by the lesser number of spines on the hind vein of the fore wing, 10-12 as compared with 15 in *flavens*. Third antennal segment is about 1.5-1.7 times longer than wide, while it is clearly three times as long as wide in this species. In *dampfi* the interocellar bristles are placed between the posterior ocelli while in this species they are placed in front of and in the direction of the anterior ocellus. *Ameliae* is much larger, 1.3 mm. in length, and abdominal tergites are blotched with gray in the middle, antennal segments three, four and five yellow at the base with remaining portions dark. Wings uniformly pale brown. In *flavens* segment three of antenna is yellow, four and five also yellow with only a slight indication of gray brown in the outer portions. *Flavens* can be distinguished from *sulphurea* by its clearer yellow color; *sulphurea*, as its name indicates, has a color of sulphur yellow, the body spines are dark and antennal segments four and five are darker with six entirely dark brown and the interocellar spines are placed between the posterior ocelli as in *dampfi*. *Flavens* may be distinguished from *gossypii* Morgan (North America) by the prominent orange colored crescents of ocelli and by the light yellow color of all body spines including postoculars which are brown in *gossypii*.

Taeniothrips hawaiiensis (Morgan).

Euthrips hawaiiensis Morgan, Proc. U. S. Nat. Mus., 46, p. 3, 1913.

Many recent collections forwarded to me indicate that *hawaiiensis* is the common representative of this genus especially on the Island Oahu. I am here presenting a brief description of the male which has not been described heretofore.

Color: body, legs and wings uniformly light yellow. Antennal segments one to three yellow, four and five yellow in basal half, brown in distal half, six brownish yellow in basal third, brown in distal two-thirds, seven and eight brown, crescents of ocelli deep orange red, although in one specimen there is only a slight indication of an orange shading and in a second specimen the crescents are clear yellow. Prominent body spines brown.

Total body length .93 mm.; head length .10 mm., width .12 mm.; prothorax length .10 mm., width .15 mm.; pterothorax width .20 mm. Segments of antenna: length (width) I, 15 (21); II, 33 (24); III, 45 (18); IV, 48 (18); V, 33 (15); VI, 48 (15); VII, 6; VIII, 6; total length 225 microns. Length of spines, antecellars and postoculars 18 m., on posterior angles of prothorax, outer 42 m., inner 45 m., longest spines on ninth abdominal segment 54, on tenth 75 microns. A series of four slender yellow spines border posterior margin of ninth tergite, inner pair slightly longer than outer ones. Spines on fore wings, costa 24, fore vein 4 and 3 in basal part and 3 scattered beyond the middle, hind vein 11.

Numerous specimens of this species were taken on roses, cotton, *Ipomoea*, *Psidium*, *Hibiscus* (wild), aster, *Canna*, *Lantana* (blossoms) and *Ipomoea insularis* by Messrs. D. T. Fullaway, F. X. Williams and O. H. Swezey at Honolulu, Tantalus and Waipahu. Specimens deposited in the collection of the Hawaiian Entomological Society, Honolulu. (Moulton Nos. 204, 205, 206, 1437, 1439, 1442, 1821, 1824, 1825, 2538 and 2540).

The male of this species upon first view resembles very closely the male of *Frankliniella flavens* but may be quickly separated from it by the placement of the spines on the fore vein of the fore wing and by the absence of prominent spines on the anterior angles of prothorax.

Thrips (Ctenothripella Pr.) abdominalis Crawf. 1910

Numerous specimens of this species were collected by Mr. O. H. Swezey from the blossoms of the following flowers: asters, Honolulu, April 13, 1927; *Verbesina encelioides*, Gilbert, Oahu, July 19, 1926; *Lantana*, Honolulu, April 18, 1927. (Moulton Nos. 1821, 1823 and 1825).

This is now recognized as a cosmopolitan species found in the

United States and Mexico and I now have specimens from India and Japan and Mr. R. S. Bagnall has recorded it from the Fiji Islands.

***Thrips tabaci* Lind.**

Numerous specimens of this species collected by Mr. O. H. Swezey from the following flowers: aster, Honolulu, April 13, 1927; *Ipomoea insularis*, Waipahu, Oahu, May 24, 1927; roses Olinda, Maui, June 15, 1927. (Moulton Nos. 1821, 2540 and 2542.)

This is a cosmopolitan species and is now recorded from the Hawaiian Islands.

***Thrips saccharoni* n. sp.**

Female holotype: Color uniformly dark grayish brown, thorax sometimes a little lighter. Abdominal segments three to eight with a distinctly darker line along anterior margin. All legs uniformly light brownish yellow. Antennal segments one and two grayish brown like thorax, two lighter in distal half, three, four and basal halves of five and six light grayish yellow, outer portions of five and six together with seven dark gray brown. Wings clear to smoky in basal fourth, uniformly brown in outer three-fourths with veins a little darker. Crescents of ocelli deep orange red.

Total body length 1.05 mm.; head length .12 mm., width .12 mm., prothorax length .12 mm., width .14 mm.; mesothorax width .20 mm.; greatest width of abdomen .21 mm. Segments of antenna: length (width) I, 15 (24); II, 33 (24); III, 48 (15); IV, 45 (15); V, 39 (15); VI, 51 (15); VII, 15; total length 246 microns. Spines on posterior angles of prothorax 42 m., on outer posterior angles of ninth abdominal segment 105 m., on tenth 90 microns.

Head about as long as wide, apex rounded, slightly constricted behind the eyes; cheeks arched, back of head with transverse wrinkles. A pair of rather prominent spines (30 m.) near anterior inner margin of eyes; interocellar spines small and placed in front of posterior ocelli and between them and the anterior ocellus. An irregular crescent-shaped row of six or seven spines bordering posterior margin of eyes, the first or inner pair 21 m., the third from the inside 30m., the fifth pair about as long as the inner ones, others shorter. Eyes prominent, slightly protruding, strongly pilose and occupying about one-half the length of the head. Ocelli rather small, though well developed, sub-approximate, placed opposite posterior half of eyes, posterior ocelli separated from inner margins of eyes. Mouth cone reaches three-fourths over prosternum. Antennae two and one-third times as long as head, with segments three to six long and slender, pedicel of segment three with a distinct smoothly rounded sub-basal thickening; forked sense cones on segments three and four slender.

Prothorax as long or slightly longer than head and only a little wider; two prominent spines on each posterior angle and a row of three on each side along posterior margin, inner pair strongest, numerous other smaller spines scattered over dorsum. Legs normal. Wings fully developed, of nor-

mal shape, reaching tip of abdomen; fore vein with seven (4-3) basal bristles and three scattered in distal half, posterior vein with thirteen.

Abdomen long and slender, comb on posterior margin of segment eight well-developed, tenth segment with dorsal suture.

This species is comparatively slender and is especially characterized by the long spines bordering the anterior inner margin of eyes.

Described from twenty-nine ♀ specimens taken from sugar cane by Mr. O. H. Swezey at Honolulu. Holotype in author's collection, paratype deposited in the collection of the Hawaiian Entomological Society, Honolulu. (Moulton No. 1449.)

Thrips sacchari Kobus has already been described from the same host plant but I do not know this species and cannot make a comparison.

***Isoneurothrips antennatus* n. sp.**

Male holotype: Color uniformly dark brown, including antennae, legs and wings, except fore legs and basal portion of wings which are a little lighter. All spines dark brown; crescents of ocelli orange red.

Total body length 1. mm.; head length .11 mm., width .16 mm.; prothorax length .12 mm., width .19 mm.; mesothorax width .25 mm.; greatest width of abdomen .22 mm. Antenna: length (width) I, 21 (30); II, 39 (27); III, 60 (18); IV, 54 (20); V, 42 (18); VI, 48 (15); VII, 24; total 300 microns. Spines, interocellars 48 m., postoculars 39 m., on posterior angles of prothorax 60 m., median dorsal spines on ninth abdominal segment 43 m. and on posterior angles 84 m., curved spines on tenth 90 microns.

Head about one-third wider than long, relatively large, apex broad and almost flat; cheeks rather abruptly arched in middle where the cheek spines are placed. Interocellar bristles strong, placed between posterior ocelli on a line connecting their anterior margins; a crescent-shaped row of spines bordering posterior margin of eyes, outer two about one-half as long as third, which is the prominent postocular, inner three spines small. Eye large, prominent, but not protruding, occupying half the length of the head, spinose, facets coarse. Ocelli large, twice as large as facets of eyes, widely separated, posterior pair almost contiguous with inner margins of eyes. Mouth cone reaching almost across prosternum, broad at base, abruptly constricted in the middle, and narrowed toward the tip. Antennae long and slender, about three times as long as head, segment seven half as long as six; forked sense cones on segments three and four.

Prothorax only a little wider than head, sides arched, angles rounded; two prominent spines on each posterior angle. subequal, other spines scattered on sides and dorsal surface. Mesothorax widest, sides rounded, metathorax smaller, sides almost parallel. Legs moderately stout with numerous spines. Wings reaching beyond tip of abdomen, veins regularly set with spines, costa 25-30, fore vein 21, hind vein 15-16.

Abdominal sternites three to seven inclusive with elongate reniform depressions, 83 x 15 microns, comb along posterior margin of segment eight fully developed but weak; median dorsal spines on segment nine rather small, a strong slightly curved spine on each posterior angle, and a similar

strong but straight shorter spine (66 m.) projecting outwards from the middle of each side, a strong and distinctly curved spine on each posterior angle of tenth segment.

Described from one ♂ specimen taken on *Metrosideros polymorpha* by Mr. F. X. Williams, Mt. Tantalus, Oahu, in April, 1926. Male holotype in author's collection. (Moulton No. 1438.)

This species may be separated from *I. multispinus* Bagn. by its larger size and uniformly dark color. *Multispinus* has a totally yellow head and thorax with a reddish brown tinge and legs yellowish white.

***Isoneurothrips dubautiae* n. sp.**

Female holotype: Color: body, legs, wings and segments one to four of antennae whitish with only a faint shading of light yellow in the more heavily chitinized parts, segment five shading to brown in outer half, six and seven dark brown, with six lighter at base. All body and wing spines transparent except prominent ones on posterior angles of prothorax and tip of abdomen which are shaded brown to dark brown. Crescents of ocelli light brownish or colorless; pigment of compound eyes deep red. Tip of mouth cone dark.

Total body length 1.26 mm.; head length .133 mm., width .15 mm.; prothorax length .15 mm., width .18 mm.; mesothorax width .25 mm. Antenna: length (width) I, 24 (30); II, 33 (27); III, 48 (20); IV, 45 (20); V, 36 (21); VI, 45 (20); VII, 18; total length 255 microns. Spines, interocellar 24 m., postoculars 27 m., pair on posterior angles of prothorax subequal 45, on posterior angles of ninth abdominal segment 96, on posterior angles of tenth abdominal segment 87 microns.

Head a little wider than long, slightly and bluntly produced in front; cheeks almost straight; all spines small, transparent and inconspicuous, only the postoculars and interocellars prominent. Eyes slightly protruding, faintly pilose, facets comparatively large. Ocelli only a little larger than facets of eyes, placed well back on head, posterior pair almost touching posterior inner margins of eyes. Mouth cone short and reaching about two-thirds across prosternum. Antennae rather compact and less than twice as long as head with normal spines and sense cones.

Prothorax with all sides and angles rounded; two prominent spines on each posterior angle, posterior marginal spines weak. Pterothorax normal. Wings reaching ninth abdominal segment, with regularly placed spines as follows: costa 25, fore vein 18-20, hind vein 14. Abdomen elongate ovate, fully developed comb along posterior margin of eighth segment; an arrangement of spines on segment nine as in *I. williamsi*.

Male allotype: Color same as in the female.

Total body length .93 mm. Abdomen: Comb along posterior margin of segment eight fully developed. Spines on wings as follows: costa 24-25, fore vein 18-19, hind vein 12.

Described from seven ♀ and ten ♂ specimens collected on *Dubautia* sp. by Mr. F. X. Williams, Mt. Tantalus, Oahu, in April,

1926. Holotype and allotype in author's collection; paratype deposited in the collection of the Hawaiian Entomological Society, Honolulu. (Moulton No. 1441.)

***Isoneurothrips fullawayi* n. sp.**

Female holotype: Color uniformly dark brown including antennae and legs, except median part of outer half of fore tibiae and all tarsi, which are light yellowish brown, and fore wings except an irregular lighter area near base. Crescents of ocelli orange-brown. All body and wing spines dark brown.

Total body length 1.16 mm.; head length .114 mm., width .144 mm.; prothorax length .12 mm., width .194 mm.; mesothorax width .255 mm. Antenna: length (width) III, 45 (21); IV, 39 (21); V, 33 (18); VI, 36 (18); VII, 18; total 225 microns. Spines, interocellar 66 m., postoculars 66 m., pair on posterior angles of prothorax sub-equal 75 m., innermost spines on posterior margin 45 m., on posterior angles of ninth abdominal segment 96 m., on tenth 81 microns.

Head about one-fourth wider than long, angular in front; cheeks roughened, slightly arched; vertex with transverse wrinkles near posterior margin. Interocellar bristles long and strong, placed between posterior ocelli and in a line connecting their anterior margins. A crescent-shaped row of six spines bordering posterior margin of each eye, the two outer ones are short and stout, the third bristle, the postocular prominent, the three inner spines are small and inconspicuous; a pair of spines on either side of anterior ocellus. Eyes large occupying one-half the length of the head, facets large, sparsely but coarsely spinose. Ocelli well developed, widely separated, posterior pair approximate, but not contiguous with inner posterior margins of eyes, crescents narrow. Mouth cone elongate, triangular and reaching to posterior margin of prosternum. Antennae moderately stout, almost twice as long as head, segment three longest, style stout and about one-half as long as six.

Prothorax one-third wider than long, all angles rounded; two long, stout spines on each posterior angle; two or three spines on each side along anterior margin, inner pair largest, outer ones smaller, four spines on either side along posterior margin, the innermost are longest; many other dark conspicuous spines averaging about 24 m. in length, scattered over dorsum. Legs moderately stout, spinose. Wings strong, reaching to tip of abdomen, 24-26 spines on costa, 18-21 on fore vein, 13-15 on hind vein, all spines evenly placed.

Abdomen elongate ovate, segment eight with fully developed comb along posterior margin, spines on segments nine and ten stout, complete dorsal suture on segment ten.

Male allotype: Color as in female, uniformly deep brown, including fore wings and legs, except tips of fore tibiae and all tarsi.

Total body length .92 mm. Conspicuously spinose like the female. Wings with spines as follows: costa 23-24, fore vein 18-19, hind vein 12-13. Oval depressions on ventral sides of abdominal segments three to seven, small, averaging about 24 m. long; fully developed comb along posterior margin of segment eight, segment nine with a pair of moderately long, stout spines (36 m.) near center along posterior margin, another smaller pair anterior to

these and more widely separated, and a single long, slightly curved spine on each posterior angle (75 m.).

Described from one ♂ and four ♀ specimens taken on *Broussonetia papyrifera* by Mr. D. T. Fullaway in Pauoa Valley, Oahu, T. H., in May, 1909. Holotype and allotype in author's collection; paratype deposited in the collection of the Hawaiian Entomological Society, Honolulu. (Moulton No. 210.)

I take pleasure in naming this species after the collector, Mr. Fullaway.

***Isoneurothrips williamsi* n. sp.**

Female holotype: Color: body, legs and wings light brownish yellow with thorax shaded a little darker, with a brown line along anterior margins of tergites three to seven. Antennal segment one whitish, two and basal third of three brownish yellow, concolorous with head, distal half of three dark grayish brown except at extreme tip where it is translucent whitish, four to seven uniformly dark gray brown except extreme base of four which is lighter. All prominent spines dark brown with a group of eight to ten on each side of abdominal segments two to seven rather conspicuous against the light color of the abdomen. Crescents of ocelli yellowish brown.

Total body length 1.5 mm. (Abdomen normal); head length .12 mm., width .15 mm.; prothorax length .16 mm., width .18 mm.; mesothorax width .26 mm. Antennae: length (width) I, 27 (30); II, 39 (27); III, 51 (24); IV, 48 (21); V, 39 (18); VI, 45 (18); VII, 21; total length 270 microns. Spines, interocellar 45 m., postoculars 39 m., on posterior angles of prothorax outer 75, inner 66, innermost in the series along posterior margin 39, on posterior angles of ninth abdominal segment 114, along posterior margin 90, on tenth segment 96 microns.

Head only slightly wider than long, rounded in front. Eyes slightly protruding, occupying less than half the length of the head, pilose, facets coarse. Ocelli a little larger than facets of eyes, widely separated, posterior pair contiguous with inner margins of eyes. Mouth cone elongate, reaching almost to posterior margin of prosternum, constricted at one-third its length from base and then gradually reduced to a narrow, almost pointed tip. Antennae only slightly more than twice as long as head, spines and sense cones normal as in other species of the genus.

Prothorax with sides arched and all angles broadly rounded, two prominent spines on each posterior angle, the outer pair somewhat longer than inner pair; inward from these is a row of three spines on either side along posterior margin, the inner pair longest. Legs slender. Wings fully developed. Spines on veins of fore wings evenly placed as follows: costa 27-28, fore longitudinal vein 25, hind vein 20.

Abdomen long and slender with a group of eight to ten dark spines on each side of segments two to seven; comb on posterior margin of segment eight well-developed with long closely placed hairs; a whorl of six strong spines along posterior margin of segment nine; a strong though shorter pair near the middle of the segment and about one-fourth the segment's width inward from either side; segment ten with four strong dorsal spines

near the middle. Dorsal suture present but difficult to observe because of the light body color.

Described from three ♀ specimens taken by Mr. F. X. Williams, Mt. Tantalus, Oahu, in April, 1926. Host plant unknown. Holotype in author's collection; paratype deposited in the collection of the Hawaiian Entomological Society, Honolulu. (Moulton No. 1440.)

I take pleasure in naming this species after the collector, Mr. Williams.

All of these new species of *Isoncurothrips* have certain characters in common which are worthy of mention. The third from the outside in the series of six spines behind each eye is long and strong and recognized as the prominent postocular, while the two outer ones are intermediate in size between the third and the three smaller inner ones. The interocellar spines are constantly placed between the posterior ocelli but near a line drawn across their upper borders. Also there are constantly two small spines on either side of the anterior ocellus. The comb on the posterior margin of abdominal segment eight is developed in the males of three of these species. The male of the fourth *I. williamsi*, is unknown.

Isoncurothrips fullawayi, would seem to most nearly approach *I. multispinus* Bagn., but differs from his description as follows:

I. fullawayi Moulton

♀ : Head and prothorax almost equal in length.

Spines on fore wing, fore vein 18-21, hind vein 12-14. Style long, one-half the length of segment six.

♂ : Length .92 mm.

Color : Uniformly deep brown except tips of fore tibiae and all tarsi which are light yellowish brown and an indistinct lighter area near base of fore wings.

I. multispinus Bagn.

♀ : Prothorax distinctly longer than head.

Spines on fore wings, fore vein and hind vein 17 each. Style one-fourth the length of segment six.

♂ : Length .65 mm.

Color : Head and prothorax totally yellow with a reddish brown tinge, antennae with a grayish brown tinge, legs yellowish white.

Selenothrips rubrocinctus (Giard), 1913

Numerous ♀ and ♂ specimens collected in Honolulu from mango leaves in November, 1909 and November, 1926 by Messrs.

D. T. Fullaway and O. H. Swezey, and from *Croton* leaves in March, 1927 by Mr. O. H. Swezey. (Moulton Nos. 226, 1146 and 1819).

TUBULIFERA

Family PHLOETHRIPIDAE Uzel, 1895

Subfamily PHLOETHRIPINAE Priesner

Tribe HOPLOTHIRIPINI Priesner

***Dermothrips hawaiiensis* Bagn. 1910.**

Two apterous specimens one ♂ and one ♀ which I am identifying as belonging to this species were collected as follows: one ♂ specimen taken from under the bark of a dead tree on February 6, 1927, in the Waianae Mts., Oahu at an elevation of 2000 feet and one ♀ specimen taken on *Suttonia* at Olinda, Maui, June 14, 1927 by O. H. Swezey (Moulton Nos. 1815 and 2545).

***Hoplothrips flavitibia* n. sp.**

Female holotype: (Macropterous) Color chestnut brown with apex, and sides of head, sides of thorax and antennal segments one, two, six and eight darker, three yellowish shading light brown at tip, four and five yellowish in basal half and six yellowish in basal third with the distal portions brown, all femora brown, all tibiae and tarsi yellow, wings uniformly light grayish brown, prominent body spines yellowish.

Total body length 2.4 mm.; head length .26 mm., width behind eyes .25 mm., width at posterior margin .22 mm.; prothorax length .22 mm., width .43 mm.; pterothorax width .43 mm.; tube length .20 mm., width at base .10 mm., at tip .04 mm. Antennae: Length (width); I, 39 (48); II, 66 (36); III, 84 (45); IV, 78 (45); V, 72 (39); VI, 72 (36); VII, 60 (30); VIII, 51; total length 540 m. Length of eye 74 m., distance between posterior margin of eye and postocular pits 24 m. Spines, postoculars 114, on anterior margin of prothorax vestigial, on anterior angles 75, mid-laterals 165, on fore coxae 90, on posterior angles outer 120, inner 150. Prominent basal wing spines, first 66, second 120, on posterior angles of ninth abdominal segment 195, at end of tube 150 microns.

Head slightly longer than wide, broadest just behind the eyes. Antennal pits concave, their depressions causing the eyes to appear slightly projecting in front; cheeks swollen behind eyes and converging evenly and gradually to the weakly neck-like constriction at posterior margin. Few cheek spines present, yellowish in color and inconspicuous. Postoculars long and pointed, placed one-third the length of the eyes from their posterior margins. Eyes relatively large. Ocelli large, placed well forward and clearly separated from the inner margin of eyes. Mouth cone reaching to near posterior margin of prosternum, broadly rounded, tip of labrum pointed. Antennae somewhat more than twice as long as head with segment eight spindle shaped and clearly separated from segment seven;

sense cones relatively long and narrowed toward the tip but not sharply pointed, segment III with three, segment IV with four, segment V with three, segment VI with two.

Prothorax twice as wide as long. Spines along anterior margin vestigial, those on anterior angles, mid laterals, fore coxae and posterior angles long and pointed. Mid laterals placed far forward and distant only 45 m. from those on anterior angles. Pterothorax slightly wider than prothorax including prominent fore coxae. Sides rather evenly but distinctly narrowed toward the posterior. Fore legs enlarged, each fore tarsus with a strong, sharp tooth. Wings fully developed with eight to ten double fringe hairs. Abdomen elongate with long spines on all segments, those on segment nine almost as long as tube.

Male allotype: (Brachypterous) Color quite uniformly yellowish brown with apex and sides of head darker, antennal segments one, six to eight, ninth abdominal segment and tube distinctly darker brown. Antennal segment two brown only at the base yellowish in outer portion, three to six yellowish with extreme base of seven yellowish, three shading gradually to brown and four and five a little deeper brown. Legs yellowish with all femora grayish brown.

Total body length 2.66 mm.; head length .25 mm., width .23 mm.; prothorax length .32 mm., width, including coxae, .55 mm.; pterothorax width .46 mm.; tube length .18 mm., width at base .1 mm. Fore femora length .40, width .166 mm. Antennae: Length (width) I, 45, (48); II, 60 (36); III, 78 (39); IV, 72 (39); V, 69 (36); VI, 63 (33); VII, 54 (27); VIII, 51; total length 495 microns. Length of eye 45 m., distance between posterior margin of eye and postocular pit 30 m. Spines, postoculars 135, on anterior margin of prothorax vestigial, on anterior angle 120, mid laterals 180, on posterior angles outer 120, inner 150, on posterior angles of ninth abdominal segment inner 180, spurs 60, at end of tube 150.

Head shaped as in female. Eyes smaller, ocelli present but very small and widely separated from eyes. Mouth cone shorter and reaching approximately to middle of prosternum. Antennae as in female.

Prothorax greatly enlarged with all spines long and pointed as in female. Pterothorax clearly smaller than prothorax and smaller than abdomen. Fore femora greatly enlarged and each fore tarsus armed with a strong tooth. Wings rudimentary. Abdomen large with segments two to four clearly broadest and gradually reduced toward the tube. Tube only slightly shorter than head with sides narrowed evenly toward the tip.

Female paratype: (Brachypterous) General color and shape like the macropterous female. Eyes smaller and shaped as in the male. Ocelli extremely small and widely separated from the eyes as in the male. Wings represented only by two small pads, each with two spines, the outer about twice as long as the inner one.

Total body length (body distended) 2.83 mm.; head length .25 mm., width behind eyes .25 mm., width at posterior margin .22 mm.; prothorax length .25 mm., width, including coxae, .46 mm.; pterothorax width .42 mm.; tube length .23 mm., width at base .10 mm. Antennae: Length (width) I, 45 (48); II, 63 (36); III, 78 (45); IV, 74 (45); V, 72 (39); VI, 66 (36); VII, 57 (33); VIII, 48; total length 510 microns. Length of eye 51 m., distance between posterior margin of eye and postocular pit 30 m.

Spines postoculars 135, on anterior margin of prothorax vestigial, on anterior angles 81-90, mid laterals 165, on prominent coxae 90, on posterior angles outer 126, inner 150, on posterior angles of ninth abdominal segment 180, at end of tube 150.

Larva uniformly yellowish gray with antennal segment one white, two light brown and three to seven dark brown and abdominal segment nine and ten brown.

Described from 12 macropterous ♀, 28 brachypterous ♀, 5 brachypterous ♂ specimens, six larvae and four pupae taken in the Waianae Mts., Oahu, under the bark of dead trees; and from old borer tunnel in dead *Suttonia* trees on Waipio Ridge, Oahu, by Mr. O. H. Swezey. Holotype in author's collection, paratypes deposited in collection of the Hawaiian Entomological Society, Honolulu. (Moulton Nos. 1815, 2549 and 2552).

This species may be compared with *laticornis* Bagnall, (*Dolerothrips*) *japonicus* Karny, (*Dolerothrips*) *lanaiensis* Bagnall and (*Dolerothrips*) *ovatus* Bagnall but separated from them as follows: *japonicus* is larger, 2.9-3.7 mm., darker in color and head is broader in the middle; *laticornis* is smaller, 2.0 mm., has short rudimentary spines on fore angles of prothorax and sixth antennal segment is not abruptly yellowish at the base; *lanaiensis* has very short bristles on posterior angles and margin of prothorax; *ovatus* is smaller, 1.9-2.8 mm., and fore coxae have only short spines on prominent angles.

***Hoplothrips mauiensis* n. sp.**

Female holotype: (Macropterous) Color chestnut brown, with apex and sides of head and sides of thorax darker; antennae dark brown, with segments three, four and five somewhat lighter in basal portions; all femora dark brown, tibiae yellowish brown, shaded a little darker in the middle, all tarsi yellow. Wings brownish gray.

Total body length 2.15 mm.; head length .25 mm., width .25 mm.; prothorax length .22 mm., width (including prominent coxae) .43 mm.; mesothorax width .45 mm.; greatest width of abdomen .46 mm.; tube length .25 mm., width at base .10 mm., at tip .05 mm. Antennae: Length (width) I, 24 (51); II, 60 (39); III, 81 (45); IV, 78 (45); V, 66 (42); VI 57 (36); VII, 54 (33); VIII, 54 (21); total length 480 microns. Spines, postoculars 105 m., on anterior margin and angles of prothorax vestigial, mid laterals 105, on fore coxae 81, on posterior angles and posterior margin 140, on posterior angles of ninth abdominal segment 150 on posterior margin 180, at end of tube 180. Only two prominent basal wing spines 105 and 150 m. respectively, basal wing spines on second paratype 60 and 150 microns. Length of eye 78 m., distance between postocular margin of eye and postocular pits 27 microns.

Head as long as wide, slightly swollen behind eyes; cheeks evenly rounded and reduced gradually toward posterior margin. Postocular spines long and pointed, a small spine immediately behind each posterior ocellus. Eyes small, semi-oval in outline. Ocelli large, widely separated, posterior pair separated from inner margins of eyes. Mouth cone large, triangular, reaching to near posterior margin of the prosternum. Maxillary and labial palpi unusually small almost vestigial. Antennae twice as long as head; segment one broadest, three sub-conical, four and five roundly clavate, four widest of intermediate segments, other distal segments gradually becoming narrower toward tip; sense cones comparatively small, 2 on segment three, 4 on segment four, 2 on segment five, 1+1 on segment six, 1 on segment seven, 1 on segment eight.

Prothorax almost twice as wide as long; spines, mid laterals, one on each prominent fore coxae and two on each posterior angle long and pointed. Fore femora enlarged, fore tarsi armed with a strong tooth. Wings fully developed with nine to ten double fringe hairs on posterior margin.

Abdominal segments two to seven of about uniform width, eight and nine abruptly smaller. Bristles on angles of abdominal segments long and pointed. Tube almost as long as head.

Female paratype: (Brachypterous) Similar in color and size to the macropterous female except that the prothorax is much larger, length .30 mm. as compared with .22 mm. and width .51 mm. as compared with .43 mm. The fore femora are larger. Eyes and ocelli are smaller as in the male and the abdomen is broadly ovate, .60 mm. in width as compared with .46 mm. in the macropterous female. Wings rudimentary.

Male allotype: (Brachypterous) Similar to the brachypterous female in color and general appearance.

Total body length 1.66 mm. (body not distended); head length .25 mm., width .23 mm.; prothorax length .30 mm., width .46 mm.; pterothorax width .46 mm.; abdomen width .55 mm.; tube length .20 mm.; width at base, .10 mm. Antennae: Length (width) I, 45 (54); II, 54 (36); III, 75 (42); IV, 66 (42); V, 63, (39); VI, 57 (33); VII, 48 (30); VIII, 45; total length 465 microns. Length of spines, postoculars 105, on anterior margin and angles of prothorax vestigial, mid-laterals 105, on fore coxae 105, on posterior angles and posterior margin 120, on posterior angles of ninth abdominal segment, inner 180, spurs 60. Length of eye 51 m., distance between posterior margin of eye and postocular pits 24 microns.

Described from seven macropterous, eleven brachypterous ♀ and three ♂ specimens collected under bark of dead *Acacia koa* tree at Olinda, Maui, October 10, 1926 and September 10, 1927 by Mr. O. H. Swezey. (Moulton Nos. 1445, 1814).

Allotype and holotype in author's collection, paratypes deposited in the collection of the Hawaiian Entomological Society, Honolulu.

***Hoplothrips swezeyi* n. sp.**

Female holotype: (Macropterous) Color deep chestnut brown with first and second abdominal segments lighter. Antennal segments one, two, six

and eight blackish brown, three yellowish in basal two-thirds, shading to dark brown in distal third, four and five yellowish in basal third and six at extreme base with distal portions abruptly blackish brown. Legs with all femora concolorous with body, fore tibiae somewhat lighter, middle and hind tibiae lighter only at extreme ends, all tarsi brown. Wings uniformly grayish brown. Postoculars and other prominent body spines clear yellow.

Total body length (abdomen drawn in) 2.66 mm.; head length .32 mm., width .26 mm.; prothorax length .20 mm., width (including coxae) .43 mm.; pterothorax width .52 mm.; tube length .22 mm., width at base .10 mm. Antennae: Length (width) I, 45 (48); II, 75 (39); III, 105 (42); IV, 105 (42); V, 90 (39); VI, 78 (33); VII, 60 (30); VIII, 48; total length 615 microns. Length of spines, postoculars 105, on anterior margin and angles of prothorax vestigial, mid-laterals 165, longest spurs on fore coxae 27, on posterior angles outer 120, inner 90. Basal wing spines 60 and 135, on posterior angles of ninth abdominal segment inner 180, outer 120, at end of tube 195 microns. Length of eye 90 μ , distance between posterior margin of eye and postocular pit 30 microns.

Head about .2 longer than wide, broadest back of eyes; cheeks converging gradually to the slight neck-like constriction at base and with a few short sharp brown spines. Postocular spines long and pointed and placed closely behind eyes. Eyes rather large with small facets. Posterior ocelli large and placed in front of a line drawn through center of eyes, approximate to but separated from their inner margins. Mouth cone triangular in shape, rounded at tip and reaching almost to posterior margin of prosternum. Labrum pointed. Antennae twice as long as head; sense cones narrow and pointed, segment III with three, IV with four, V with two, VI with two, segment eight rather broadly joined to segment seven but clearly separated.

Prothorax trapezoidal in shape and sides evenly formed, mid-laterals and a pair of spines on each posterior angle long and pointed. Pterothorax clearly wider than prothorax. Fore femora enlarged, each fore tarsus armed with a sharp tooth. Wings fully developed, broadest at base, gradually narrowing to a broadly rounded tip. Each fore wing with twelve double fringe hairs and two prominent basal spines, distal one being about three times as long as the proximal one.

Abdomen long and broad with second segment largest. Tube about .3 shorter than head.

Female paratype: (Brachypterous) Colored and shaped as in macropterous form but with eyes and ocelli smaller, pterothorax smaller and abdomen more broadly ovate, also the outer spines on the posterior angles of each abdominal segment are much shorter than the inner pair, being approximately one-half as long and intermediate in size between these same spines of the macropterous female and the brachypterous male. Wings represented only by small pads.

Male allotype: (Brachypterous) Similar to the brachypterous female except that the fore femora are more greatly enlarged and the abdomen is reduced gradually from second segment on instead of being broadly ovate, and one pair of spines on the posterior angles of ninth abdominal segment is reduced to spurs.

Total body length (abdomen drawn in) 1.6 mm.; head length .25 mm., width .22 mm.; prothorax length .20 mm., width .38 mm.; pterothorax width .42 mm.; abdomen width .50 mm.; tube length .20 mm., width at base .08 mm. Antennae: Length (width) I, 30 (42); II, 52 (33); III, 87 (36); IV, 75 (36); V, 75 (36); VI, 60 (33); VII, 51 (30); VIII, 45; total length 495 microns. Length of eyes 60 m., distance between posterior margin of eye and postocular pit 30 m. Length of spines, postoculars 90 m., on anterior margin and anterior angles of prothorax vestigial, mid-laterals 120, on posterior angles, outer 90, inner 60, on posterior margin of ninth abdominal segment inner 150, outer, spurs 30, at end of tube 150 microns.

Larva light brownish yellow with antenna, legs and last two abdominal segments brown, bright red pigment uniformly distributed throughout head, thorax and abdomen except for a series of white spots, one on either side of each abdominal segment.

Described from 4 macropterous and 8 brachypterous ♀ and 4 brachypterous ♂ specimens taken at Olinda, Maui, on dead wood of *Pipturus*, *Suttonia* and dead stems of *Rubus hawaiiensis* on June 14, 1927 by Mr. O. H. Swezey. Holotype and allotype in author's collection, paratypes deposited in the collection of the Hawaiian Entomological Society, Honolulu. (Moulton Nos. 2544, 2545, 2546).

This species appears to stand nearest to *H. ovatus* Bagnall (*Dolerothrips ovatus* Bagn.) but may be separated by its shorter head, long mouth cone which reaches almost to posterior margin of prosternum and by the distinctly brownish colored wings; also it may be separated from *H. (Dolerothrips) intermedius* Bagnall by its differently colored antennae and darker fore femora.

***Macrophthalthothrips hawaiiensis* n. sp.**

Female holotype: Color: head and thorax deep brown, blotched sparsely with red pigmentation, abdomen lighter, gradually shading to the dark tube which is concolorous with head. Legs with all femora dark brown, fore tibiae yellowish, shaded brown on upper and lower margins of basal two-thirds, middle and hind tibiae dark brown, yellow at extreme base and in distal third, all tarsi yellow. Antennal segments one and two dark brown, two shading lighter in outer half, three light brownish yellow shading brownish gray in outer third, four to eight dark gray brown. Wings grayish brown, lighter at base, each with a dark median line which fades before the end.

Total body length 2.22 mm.; head length .30 mm., width .18 mm.; prothorax length .18 mm., width .28 mm.; pterothorax width .33 mm.; greatest width of abdomen .33 mm.; tube length .13 mm.; fore femora length .20 mm., width .10 mm. Segments of antennae: length (width) II, 60 (30); III, 99 (27); IV, 78 (30); V, 63 (25); VI, 60 (25); VII, 45 (21); VIII, 30; total length 465 microns. Length of spines, on anterior angles of

prothorax 30 m., mid-laterals 30 m., on posterior angles, outer 60 m., inner 42 m., on posterior angles of ninth abdominal segment 105, on posterior margin 90, at tip of tube 120 microns. Basal wing spines 36, 42 and 45 m. respectively.

Head one and two-thirds times as long as greatest width, eyes large occupying the entire anterior end of the head and in outline forming a half circle, broken in the center only by the projecting lobe bearing the ocelli; cheeks abruptly widened behind the eyes, almost parallel for a short distance, then smoothly and evenly constricted into a long broad neck with almost parallel sides. Eyes with small facets, not pilose, coming together on the dorsal side and completely surrounding the ocelli. Postocular spines apparently wanting. Mouth cone long and pointed, almost needle-like, reaching to the middle of metasternum. Maxillary and labial palpi very long. Antennae attached to anterior ventral side of head so that the basal segments cannot be seen in dorsal view, exposed portion about one and one-half times as long as head, segment three elongate cone-shaped, but constricted at the extreme tip, four and five vase-shaped, with ends constricted, six and seven elongate ovate, but constricted at the base, eight broadly and closely joined to seven; sense cones moderately long and stout, 2 near tip of segment three, 4 on four, and 2+1 on five, 1+2 on six, and 1 on seven.

Prothorax about equal in length to width of head, sides gradually diverging to posterior margin, dorsal surface marked with numerous transverse confluent striations, all prominent spines with dilated tips. Anterior half of mesanotal plate with striations similar to those on head and metanotal plate with longitudinal confluent striations. Femora of fore legs enlarged but unarmed, fore tibiae and tarsi also unarmed. Wings reaching to sixth abdominal segment, rather narrow but not constricted in the middle. Fore pair indistinctly and irregularly reticulate especially along dark median line. Three spines with dilated tips on fore margin at base of wing, the first two closely placed 15 m. apart, the third 60 m. from the second; with nine to ten double fringe hairs along posterior margin near tips.

Abdomen elongate with long spines on posterior angles especially on segments five to nine. Tube slender, less than half as long as head. Terminal spines as long as tube.

Male allotype: Color similar to female.

Total body length 1.75 mm.; head length .28 mm., width .166 mm.; prothorax length .18 mm., width .30 mm.; pterothorax width .26 mm.; tube length .13 mm. Antennae: length (width) II, 45 (30); III, 99 (24); IV, 84 (27); V, 72 (24); VI, 66 (21); VII, 45 (21); VIII, 33; total length of segments II-VIII 450 microns. Length of fore femora .28 mm., width through center .133 mm. Length of spines on anterior angles of prothorax 30 m., on posterior angles, outer 45 m., those on prominent fore coxae 45 m.; those at base of fore wings along anterior margin, first 30 m., second 36 m., third 45 microns.

Smaller than female but strikingly different in the enlarged prothorax and the greatly enlarged and armed fore legs. Sides of prothorax expanding so that the posterior margin is almost twice as wide as the anterior margin; spines with dilated tips. Fore femora are about as wide in the middle as basal portion of head, with a large conspicuous swelling

at the extreme base on the inner margin and a long prominent spur (15 m.) on the inner margin at about two-thirds the femora's length. Fore tibia with a low but distinct swelling on the inner margin at about three-fifths its length. Fore tarsus armed with a curved tooth arising at extreme end of first segment.

Described from one ♀ and two ♂ specimens taken from under the bark of a dead *Acacia koa* tree by Mr. O. H. Swezey at Olinda, Maui, T. H., in October, 1926. These specimens were collected along with *Phloeothrips mauiensis* and *Hoplothrips mauiensis*. Holotype and allotype in author's collection, paratype deposited in collection of Hawaiian Entomological Society, Honolulu. (Moulton No. 1445).

This species is closely related to *Macrophthalmothrips argus* Karny but may be separated by its shorter head, .30 mm., as compared to .40 mm. in *argus*, and the narrower prothorax, .28 mm., as compared with .37 mm. in *argus*.

Tribe HAPLOTHRIPINI Priesner

Haplothrips fusca n. sp.

Female holotype: Color uniformly brown including all segments of antennae and legs except only third and extreme tips of fore tibiae and fore tarsi which are a shade lighter. Wings transparent.

Total body length 1.83 mm.; head length .18 mm., width .166 mm.; prothorax length .15 mm., width .26 mm.; pterothorax width .30 mm.; abdomen width .32 mm.; tube length .11 mm., width at base .06 mm. Left antennae: Length (width) Right antennae: Length (width):

L. I, 24;	II, 36;	III, 39;	IV, 39;	V, 39;	VI, 36;	VII, 33;	VIII, 27;
(27)	(30)	(27)	(30)	(27)	(27)	(24)	
R. I, 24;	II, 36;	III, 39;	IV, 42;	V, 33;	VI, 39;	VII, 18;	
(27)	(30)	(27)	(30)	(27)	(24)		

Total length of left antenna 285 m., total length of right 240 microns. Length of spines, postoculars 42 m., on anterior margin of prothorax, vestigial, not over 12-15 m., on anterior angles 30, mid laterals 18, outer spines on posterior angles 48, inner 45, on ninth abdominal segment 72-75, on tip of tube 105-120. Basal wing spines 30, 30 and 45 respectively.

Head about .1 longer than wide; cheeks evenly and slightly arched, apex rounded. Postocular spines distinct, though rather small and pointed, about .6 as long as eye. Eyes slightly protruding in front. Ocelli large, placed in front of a line drawn through center of eyes and contiguous with their inner margins. Mouth cone short and blunt, reaching about half way across prosternum. Antennae one and one-half times as long as head, all segments rather short and broad, with segment three 1.4 times as long as wide and without a sense cone on inner side. Right antenna in this holotype specimen is abnormal with only seven segments.

Prothorax clearly transverse and shorter than head, prominent spines with blunt tips. Pterothorax with sides slightly and evenly arched. Legs normal, each fore tarsus armed with a minute tooth. Wings narrowed in the middle, fore wings with six to seven double fringe hairs, first two basal wing spines with blunt tips and third pointed. Abdomen elongate. Tube .66 as long as head and only twice as long as width at base. Spines on ninth abdominal segment rather short, terminal spines as long as tube.

Two female paratypes have 7-segmented antennae like the holotype.

Male allotype: Similar in color to female except fore tibiae, fore tarsi and also third antennal segment which are lighter yellowish brown, and the body is smaller. Length 1.66 mm. Length of spines, postoculars 30 m., on anterior margin of prothorax, vestigial, on anterior angles 36, mid laterals 27, on fore coxae 24, on posterior angles, outer 45, inner 45, on ninth abdominal segment inner 90, outer (spurs) 30, on end of tube 120 m. Basal wing spines, on left wing 24, 33 and 45 and on right wing 24, 33 and 33 respectively, the first two with blunted tips on each wing, the second with pointed tips on left wing and blunted on right wing.

Shaped as in the female except that the fore femora are much larger and fore tarsal tooth clearly stronger. There is a distinct median blackish brown line on prothorax extending from near anterior margin to the posterior margin, and the outer pair of spines on the posterior angles of abdominal segment nine are reduced to spurs. Wings with five to eight double fringe hairs. Abdomen narrowed gradually and evenly from second segment toward tube. The second male paratype is like the female in that there is no median dorsal line on prothorax.

Described from 4 ♀ and 2 ♂ specimens taken at Ft. Kamehameha, Oahu on *Batis maritima* flowers on May 8, 1927 by Mr. F. X. Williams. Allotype and holotype are in author's collection, paratype deposited in the collection of the Hawaiian Entomological Society, Honolulu. (Moulton No. 2539).

This species has the general appearance of *Haplothrips gowdeyi* (Franklin) except that antennal segments three to six are almost uniformly brown with segment three only a shade lighter and without a sense cone on the inner side. It may also be separated from *H. usitatus* Bagnall by the uniformly brown tarsi except in the male where they are lighter, and the absence of a sense cone on inner side of segment three. The tarsi are yellow in *H. usitatus* and there is a sense cone on the inner side of third antennal segment.

***Haplothrips gowdeyi* (Franklin), 1908**

Specimens taken on cotton by Mr. D. T. Fullaway at Honolulu, in 1909 and more recently collected on *Leucaena glauca*, *Panicum torridum*, *Verbesina encelioides*, *Canna*, *Lantana*, *Vernonia cinerea*, *Emilia sonchifolia* and cockscomb by Messrs. O. H. Swezey and

F. X. Williams in 1926 and 1927 at various places on the island of Oahu. (Moulton Nos. 1439, 1447, 1448, 1818, 1823, 1824, 1825, 2549, 2550, 1551).

This species has also been recorded from Southern United States, Mexico, Central America, Cuba, Porto Rico, St. Vincent, Barbados and Australia.

Kentronothrips new genus (Kentron=spur.)

Head one and one-half times as long as wide; cheeks almost straight, smooth, slightly narrowed behind. Eyes relatively small, elongate, sub-triangular in shape, occupying less than one-third the side of the head; not protruding. Postocular spines long. Antennae 8-segmented. Ocelli widely separated, fore ocellus on apex. Mouth cone very short, being only about half as long as width at base, broadly rounded. Prothorax one-third shorter than long, expanding toward the posterior. Fore femora greatly enlarged in both the male and female, more so in the male than in the female, with a blunt swelling at the base on the inside, inner margin roughened; fore tibia stout with a broad rectangular tooth at the extreme tip which supports the long spur-like tarsal tooth. The tooth on the tibia in the female is smaller than in the male, triangular in shape and the tarsal spur is smaller. Wings constricted in the middle. Tube elongate but only about .6 as long as the head.

I am placing this genus in the subfamily *Phloeothripinae*, Tribe *Haplothripini* Pr. according to Dr. Priesner's latest classification (Ref.: Die Thysanopteren Europas Part III, p. 477). The genus is near *Androthrips* Karny because of the enlarged fore femora which has a blunt swelling at the base. It also has the short rounded mouth cone and wings constricted in the middle similar to the genus *Haplothrips* Serv. It might also be placed near *Podothrips* Hood, differing from it by the more elongated and differently shaped head and smaller eyes. This genus also has an armed fore tibia as in *Kladothrips* Froggatt.

Kentronothrips hawaiiensis n. sp.

Female holotype: Color uniformly dark brown, except antennal segments three to seven and all tibiae and tarsi which are yellow.

Total body length 2.66 mm. (abdomen distended); head length .26 mm., width .166 mm.; prothorax length .20 mm., width .33 mm.; greatest width of abdomen .35 mm.; tube length .166 mm., width at base .16 mm., width at tip .08 mm. Antennae: Length (width) I, 33 (42); II, 45 (30); III, 57 (27); IV, 54 (30); V, 51 (27); VI, 45 (24); VII, 45 (21); VIII, 42; total length 375 microns. Spines, postoculars 60, on anterior margin of prothorax vestigial, on anterior angles 36, mid-laterals 15, on prominent coxae 45, a pair on posterior angles sub-equal, 48, on posterior angles of ninth abdominal segment 175, at tip of tube 120 microns.

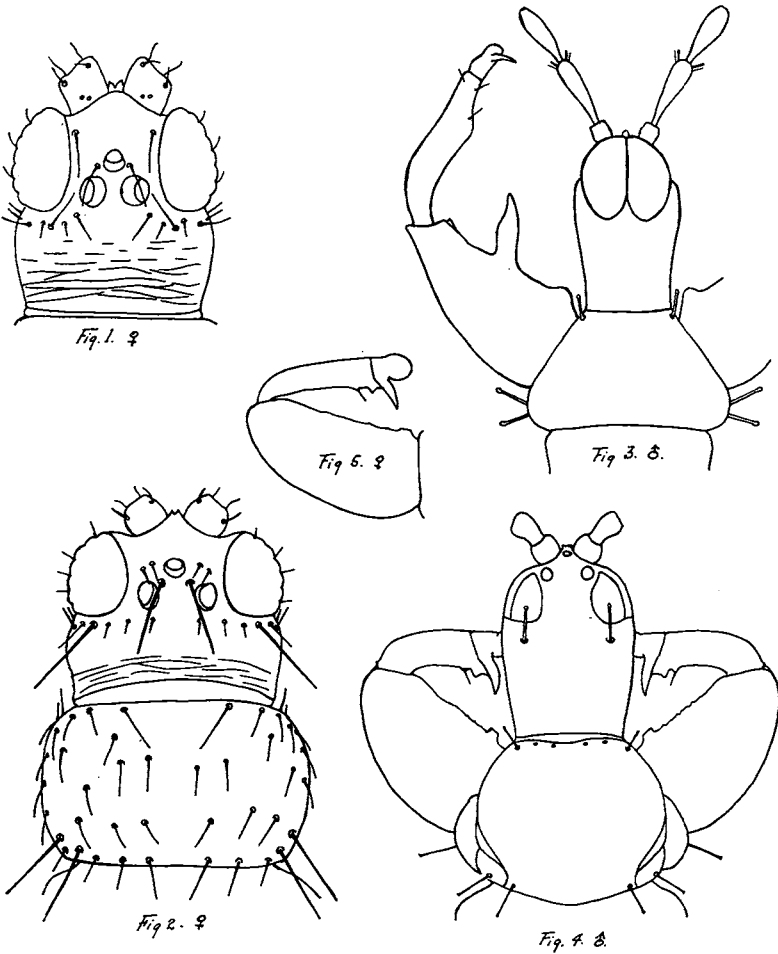


Fig. 1. *Thrips saccharoni*.

Fig. 2. *Isoneurothrips fullawayi*.

Fig. 3. *Macrothalthrothrips hawaiiensis*.

Fig. 4. *Kentronothrips hawaiiensis*.

Fig. 5. *Kentronothrips hawaiiensis* foreleg of female.

Head 1.6 times as long as wide; cheeks slightly and evenly rounded to the somewhat narrower base. Postocular spines transparent with blunt tips. Eyes elongate, sub-triangular, occupying less than one-third the length of the head; facets small, not pilose. Anterior and posterior margins of eyes joining front and sides of head smoothly. Ocelli widely separated, placed far forward on head, anterior ocellus smaller, placed at tip of vertex near basal segments of antennae, posterior ocelli approximate to inner anterior margin of eye. Mouth cone unusually short, not over half its breadth at base, broadly rounded at tip. Antennae less than one and one-half times as long as head, slender, with first segment broadest, seventh and eighth clearly separated.

Prothorax with sides expanding evenly to the prominent coxae, posterior angles broadly rounded, posterior margin semicircular, all spines with blunt tips. Spines on anterior angles short, mid-laterals vestigial, two on each posterior angle and a similar one on each prominent fore coxae. Median dorsal longitudinal thickening present. Pterothorax with fore angles rounded, sides slightly and evenly arched, only a little wider than the abdomen, joining it broadly.

Fore legs greatly enlarged, fore femora almost as long as head, center about three-fourths as wide as head, a small rounded swelling at extreme base on the inside. Fore tibiae with a small triangular tooth on the inside near the tip and immediately behind it a short spine arising from a small tubercle. Fore tarsus with a distinct spur. Wings reaching about to sixth segment, narrowed in the middle and continuing rather narrow to the tip, without double fringe hairs.

Abdominal segments two to seven almost equal in both length and breadth. Tube elongate but only about .6 as long as head. Posterior pairs of wing-confining spines long and strong only on segments three, four and five. Two long blunt tipped spines on each posterior angle of segments three to eight, segment nine with long pointed spines; those at end of tube about as long as tube itself.

Male allotype: Colored and shaped as in the female except that the fore femora are somewhat larger and the abdomen is more slender.

Fore femora with inner margins noticeably roughened. Tooth at end of fore tibiae almost rectangular in shape, adjoining and supporting the large tarsal tooth and with a spine-bearing tubercle immediately at its base; fore tarsal spur longer than in the female; pointed spines on posterior angles of segment nine short, 48 m., inner posterior marginal spines long (120 m.)

Described from one ♀ and three ♂ specimens taken by the writer, October 1909 in quarantine on sugar cane arriving at San Francisco, California, from Honolulu, and 4 ♀ and 17 ♂ specimens taken at Honolulu from beneath the leaf sheaths of sugar cane on August 15, 1927, by Mr. O. H. Swezey (Moulton Nos. 225 and 2553). Holotype and allotype in author's collection, paratype deposited in the collection of the Hawaiian Entomological Society, Honolulu. I wish here to express my appreciation to Dr. H. Priesner for examining these specimens and for his suggestions in their classification.

Mesothrips setidens n. sp.

Female holotype: Color uniformly dark chestnut to blackish brown, fore tibiae lighter in the middle when viewed from the side, all tarsi brown. Antennae almost uniformly blackish brown. Wings brownish gray, darker at borders, fore pair with a median darker line extending to near middle of wings.

Total body length 4.9 mm.; head length .50 mm., width .30 mm.; prothorax length .25 mm., width (including coxae) .60 mm.; pterothorax width .75 mm.; abdomen, width of third segment .80 mm.; length of ninth segment .20 mm.; length of tube .62 mm., width at base .133 mm., at tip .066 mm. Antennae: Length (width) I, 60 (60); II, 90 (45); III, 159 (51); IV, 165 (54); V, 135 (45); VI, 105 (39); VII, 90 (33); VIII, 54; total length 900 microns. Length of spines, postoculars 210 m., antecellar and postocellar sub-equal 60 m., spines back of postoculars and near center of head 105 m., on anterior margin of prothorax 75 m., on anterior angles 99 m., mid-laterals 108 m., on prominent coxae 63 m., the pair on posterior angles sub-equal, 180 m., on ninth abdominal segment 550 m., at end of tube 330 m. Basal wing spines 75, 120 and 240 m. respectively.

Head sub-rectangular in shape, 1.6 mm. times as long as wide, and twice as long as median dorsal line of prothorax, apex broad and flat; cheeks almost parallel. Postocular spines long and strong, extending far in front of eyes. The distance between postocular pits and the posterior margin of eyes is 45 microns which is approximately one-third the length of the eye. A single pair of spines on either side of anterior ocellus and placed approximate to inner anterior border of eye slightly less than one-third the length of postoculars, another spine of about the same length behind each posterior ocellus placed near inner margin of eyes. Vertex with another pair of spines placed behind and inward from postocular and near center of head, these are about one-half as long as postoculars. Eyes large, nearly oval in outline and occupying about one-fourth the length of the head; facets small. Ocelli large, 33 m. in diameter, placed just in front of a line drawn through center of eyes and contiguous with their inner margins. Mouth cone triangular, rounded at tip and reaching about three-fourths across prosternum. Labrum constricted near middle and drawn out to a sharp point.

Prothorax including prominent coxae two and one-half times as wide as greatest dorsal length, fore margin strongly concave with a conspicuous dark median dorsal line broadened in front and extending to the posterior margin. All normal spines present. Pterothorax with evenly rounded sides. Legs long, fore femora thickened. Each fore tarsus with a strong tooth.

This tooth is especially noticeable because it bears three distinct spines near the middle of its outer margin, these spines 45, 27 and 12 m. long respectively on the left tooth and 60, 36 and 12 microns on the right tooth.

Abdomen elongate, a little wider than pterothorax and reduced in size gradually beyond third segment, with long prominent spines especially on distal segments, those on segment nine almost as long as tube with spines at tip of tube very much smaller and less than half the length of those on segment nine. Tube long and slender, 1.2 times longer than head.

Described from one ♀ specimen taken at Manoa Valley, Oahu, on April 8, 1927, by Mr. F. X. Williams. Host plant not known. Type in the author's collection. (Moulton No. 1820.)

I am placing this species with some hesitation in the genus *Mesothrips*. The presence of a pair of spines on either side of the anterior ocellus and a second pair behind the posterior ocelli while distinct are apparently not strong enough to place this species either in the genus *Diceratothrips* Bagnall or *Dichaetothrips* Hood. The enlarged fore femora and armed fore tarsi in the female would seem to throw it out of the genus *Cryptothrips*. Long abdominal bristles would also seem to throw it out of the genus *Mesothrips* and it does not clearly belong in this genus, but I hesitate to erect a new genus without more material for study. The spines on the teeth of fore tarsi are also especially to be mentioned.

Tribe PHLOETHRIPINI Priesner

Phloeothrips (Phloeothrips) mauiensis n. sp.

Female holotype: Color mahogany brown, abdominal segments two to five lighter; antennal segments one and two, distal portions of three to five and six to eight, three whitish in basal half, four in basal third and five at extreme base brown, legs with all femora brown, tibiae light brown to brown, but yellowish white at either end. All tarsi yellowish. Forewings brownish gray, lighter at base in the middle and at tip; hind wing brownish-gray with a darker median longitudinal line fading before tip. Prominent spines light brownish to transparent. Crescent of ocelli deep red.

Total body length 1.80 mm.; head length .22 mm., width .18 mm.; prothorax length .15 mm., width (including prominent coxae) .30 mm.; pterothorax width .32 mm.; tube length .133 mm. Antennae: Length (width) I, 27 (36); II, 54, (30); III, 63 (33); IV, 63 (33); V, 60 (27); VI, 48 (24); VII, 42 (21); VIII, 27; total length 390 microns. Spines, postoculars 24 m., on anterior angles of prothorax 36 m., mid-laterals 24 m., on posterior angles 45, on outer 45, inner 36, on prominent coxae 24, on posterior angles of ninth abdominal segment 66, end of tube 105 microns. Basal wing spines 30, 30 and 75 microns respectively.

Head about one-fifth longer than wide; cheeks abruptly swollen behind the eyes, then almost straight and parallel to the slightly neck-like constriction near posterior margin. A few inconspicuous spines on small tubercles along sides; postocular spines short and stout with widely dilated tips. Eyes prominent, large, occupying two-thirds the width of the head, facets small, not pilose. Ocelli well-developed, approximate, placed far forward, anterior ocellus on apex, posterior pair in front of a line drawn through center of eyes. Mouth cone very long, triangular in shape to the posterior margin of prosternum and then drawn out into a long slender point reaching to middle of mesosternum. Maxillary palpus with short first segment and very long second segment (36 m.). Labial palpi also long with segments measuring 30 m., 21 m., and the end segment 27 m., total length 72 m. Antennae about one and three-fourths times as long as head; sense cones moderately long and stout, 3 on segment three, 4 on segment four, 2+1 on segment five, 2 on segment six, and 1 on segment seven.

Prothorax including protruding coxae twice as wide as long; all prominent spines stout with widely dilated tips. Legs rather small, slender, fore femora thickened only a little, each fore tarsus armed with a small tooth. Wings reaching to seventh abdominal segment. Fore wings with three stout transparent spines having dilated tips on anterior margin near base, with a slight constriction near the middle, and eight to ten double fringe hairs on posterior margin. Hind wings about one-third narrower.

Abdomen elongate, segments two to seven of equal width, eight and nine reduced, tube slender, two-thirds as long as head.

Male allotype: About as large as and colored as in female except that the body is a little lighter and the fore femora yellow to yellowish brown in distal portion and all tibiae yellowish with middle and hind tibiae slightly brown in the middle.

Cheek spines stronger, all prominent dilated head and body spines longer, especially the postoculars (63 m.) those on anterior angles of prothorax (75 m.), and mid-laterals (66 m.); those on posterior angles of prothorax 66 m., on prominent coxae 30 m.; on margin of fore wings near base 45, 27 and 78 microns. Fore femora greatly enlarged, tarsal tooth stronger. Abdomen reduced in size gradually from segment two to tip.

Larvae are translucent yellowish white with antennal segments three to seven gradually shading from brown to dark brown, tube brown. Pupae are colored like the larvae but without deep brown on antenna and tube.

Described from thirteen ♀ and fourteen ♂ specimens taken under the bark of a dead *Acacia koa* tree by Mr. O. H. Swezey at Olinda, Maui, T. H., in October, 1926. Holotype and allotype in author's collection; paratype deposited in the collection of the Hawaiian Entomological Society, Honolulu, T. H. (Moulton No. 1445.)

This species should be classified in Priesner's key (Ref.: Priesner, 1923, *Thysanoptera of Surinam*, p. 102) under the subgenus *Phlocothrips* and near the species *salicinus* Pr., found in Austria.

List of Thysanoptera Known from the Hawaiian Islands.

TEREBRANTIA

Family ÆOLOTHRIPIDÆ Haliday, 1836

Acolothrips fasciatus (Linn.), 1761.

Host: *Cyathodes tameiameiae*.

Family THRIPIDÆ Uzel, 1895

Subfamily HELIOTHRIPINÆ Karny

Heliothrips haemorrhoidalis Bouche, 1833.

Host: Croton leaves, Fuschia, *Metrosideros polymorpha* and other plants.

Subfamily CHIOTHRIPINAE Karny

Limothrips cerealium Halid. 1836.

Host: Various grasses.

Chirothrips mexicanus Crawford, 1909.

Host: *Chloris paraguayensis*, *Eragrostis variabilis*.

Subfamily SERICOTHRIPINAE Karny

Tribe ANAPHOTHRIPINI Priesner

Anaphothrips (*Chaetanaphothrips*) *orchidii* (Moulton), 1907.

Host: *Commelina nodiflorum*.

Anaphothrips (*Anaphothrips*) *swezeyi* Moulton, n. sp.

Host: *Chaetochloa verticillata* and *Panicum torridum*.

Subfamily THRIPINAE Karny

Scolothrips sexmaculatus (Pergande), 1894.

Host: *Psidium* sp.

Frankliniella flavens Moulton, n. sp.

Host: Young corn plants.

Taeniothrips hawaiiensis (Morgan), 1913.

Host: Flowers of roses, cotton, *Psidium* sp., *Hibiscus* (wild), Aster, Canna, Lantana and *Ipomoea insularis*.

Thrips (*Ctenothripella* Pr.) *abdominalis* Crawford, 1910.

Host: Flowers of Aster, *Verbesina encelioides* and Lantana.

Thrips tabaci Lind., 1888.

Host: Flowers of Aster, *Ipomoea insularis* and roses.

Thrips saccharoni Moulton, n. sp.

Host: Sugar cane, in the spindle.

Isoneurothrips antennatus Moulton, n. sp.

Host: *Metrosideros polymorpha*.

Isoneurothrips dubautiae Moulton, n. sp.

Host: *Dubautia* sp.

Isoneurothrips fullawayi Moulton, n. sp.

Host: *Broussonetia papyrifera*.

Isoneurothrips multispinus (Bagnall), 1910.

Host: Unknown.

Isoneurothrips williamsi Moulton, n. sp.

Host: Unknown.

Selenothrips rubrocinctus (Giard), 1913.

Host: Mango and Croton leaves.

TUBULIFERA

Family PHLOETHRIPIDAE UZEL, 1895.

Subfamily PHLOETHRIPINAE Priesner

Tribe HOPLOTHROPINI Priesner

Agnostochthona alienigera Kirkaldy, 1907.

Host: Under the bark of a dead tree.

Dermothrips hawaiiensis Bagnall, 1910.

Host: Under the bark of a dead Suttonia tree.

Dolerothrips angusticeps Bagnall, 1910.

Host: Unknown.

Dolerothrips barbatus Bagnall, 1910.

Host: Under a decayed log.

Dolerothrips bicolor Bagnall, 1910.

Host: Unknown.

Dolerothrips dubius Bagnall, 1910.

Host: Unknown.

Dolerothrips flavipes Bagnall, 1910.

Host: Under bark.

Dolerothrips intermedius Bagnall, 1910.

Host: Unknown.

Dolerothrips lanaiensis Bagnall, 1910.

Host: Unknown.

Dolerothrips ovatus Bagnall, 1910.

Host: Unknown.

Dolerothrips perkinsi Bagnall, 1910.

Host: Unknown.

Hoplothrips flavitibia Moulton, n. sp.

Host: Under the bark of dead trees and from old borer tunnel in dead Suttonia trees.

Hoplothrips laticornis (Bagnall), 1910.

Host: Unknown.

Hoplothrips muiensis Moulton, n. sp.

Host: Under bark of dead koa tree.

Hoplothrips nigricans (Bagnall), 1910.

Host: Unknown.

Hoplothrips svezeyi Moulton n. sp.

Host: In dead wood of *Pipturus*, *Suttonia*, and dead stems of *Rubus hawaiiensis*.

Macrophthalthothrips hawaiiensis Moulton, n. sp.

Host: Under the bark of a dead koa tree.

Nesothrips oahuensis Kirkaldy, 1907.

Host: Probably on flowers (per Kirkaldy reference).

Oedemothrips laticeps Bagnall, 1910.

Host: Unknown.

Tribe HAPLOTHRIPINI Priesner

Haplothrips fusca Moulton, n. sp.

Host: *Batis maritima* flowers.

Haplothrips gorwedei (Franklin), 1908.

Host: Flowers of cotton, *Leucaena glauca*, *Panicum torridum*, *Verbesina encelioides*, Canna, Lantana, *Vernonia cinerea*, *Emilia sonchifolia* and cockscomb.

Haplothrips usitatus (Bagnall), 1910.

Host: Hilo grass (*Paspalum conjugatum*).

Kentronothrips hawaiiensis Moulton, n. sp.

Host: Sugar cane, beneath leaf-sheaths.

Mesothrips setidens Moulton, n. sp.

Host: Unknown.

Tribe PHLOETHRIPINI Priesner

Phloeothrips muiensis Moulton, n. sp.

Host: Under the bark of a dead koa tree.

Subfamily MEGATHRIPINAE Priesner

Tribe COMPSOTHRIPINI Priesner

Diceratothrips brevicornis Bagnall, 1910.

Host: Unknown.